

Claims:

1. A polypeptide, the polypeptide having an amino acid sequence as set out in SEQ. ID. NO. 1 from amino acid 37 to 1114, or a sequence having at least 50% identity thereto, or a functional fragment thereof.
2. A polypeptide as claimed in claim 1, the polypeptide having a sequence of at least 70% identity with the sequence shown in SEQ. ID. NO:1 from amino acid 37 to 1114.
- 10 3. A polypeptide as claimed in claim 1, the polypeptide having a sequence of at least 80% identity with the sequence shown in SEQ. ID. NO:1 from amino acid 37 to 1114.
- 15 4. A polypeptide as claimed in claim 1, the polypeptide having a sequence of at least 90% identity with the sequence shown in SEQ. ID. NO:1 from amino acid 37 to 1114.
- 20 5. A polypeptide as claimed in any one of claims 1 to 4, the polypeptide having protease activity.
6. A nucleic acid molecule, the nucleic acid molecule comprising a sequence encoding a polypeptide as claimed in any one of claims 1 to 5.
- 25 7. A nucleic acid molecule comprising a sequence as set out in SEQ. ID. NO:2 or a sequence having at least 60% identity thereto, or a sequence which hybridises thereto under stringent conditions.
- 30 8. A nucleic acid molecule as claimed in claim 7, the nucleic acid molecule comprising a sequence having least 70% identity with the sequence shown in SEQ. ID. NO:2.
- 35 9. A nucleic acid molecule as claimed in claim 7, the nucleic acid molecule comprising a sequence having least 80% identity with the sequence shown in SEQ. ID. NO:2.

10. A nucleic acid molecule as claimed in claim 7, the nucleic acid molecule comprising a sequence having least 90% identity with the sequence shown in SEQ. ID. NO:2.

5 11. A composition for use in raising an immune response in an animal, the composition comprising the polypeptide as claimed in any one of claims 1 to 5 or a nucleic acid sequence as claimed in claim 6 and optionally a carrier and/or adjuvant.

10 12. A polypeptide, the polypeptide having an amino acid sequence as set out in SEQ. ID. NO:3 from amino acid 26 to 616, or a sequence having at least 50% identity thereto, or a functional fragment thereof.

15 13. A polypeptide as claimed in claim 12, the polypeptide having a sequence of at least 70% identity with the sequence shown in SEQ. ID. NO:3 from amino acid 26 to 616.

20 14. A polypeptide as claimed in claim 12, the polypeptide having a sequence of at least 80% identity with the sequence shown in SEQ. ID. NO:3 from amino acid 26 to 616.

25 15. A polypeptide as claimed in claim 12, the polypeptide having a sequence of at least 90% identity with the sequence shown in SEQ. ID. NO:3 from amino acid 26 to 616.

16. A polypeptide as claimed in any one of claims 12 to 15, the polypeptide having lipase activity.

30 17. A nucleic acid molecule, the nucleic acid molecule comprising a sequence encoding a polypeptide of any one of claims 12 to 16.

18. A nucleic acid molecule comprising a sequence as set out in SEQ. ID. NO:4 or a sequence having at least 60% identity thereto, or a sequence which hybridises thereto under stringent conditions.

19. A nucleic acid molecule as claimed in claim 18, the nucleic acid molecule comprising a sequence having at least 70% identity with the sequence shown in SEQ. ID. NO:4.

5 20. A nucleic acid molecule as claimed in claim 18, the nucleic acid molecule comprising a sequence having at least 80% identity with the sequence shown in SEQ. ID. NO:4.

10 21. A nucleic acid molecule as claimed in claim 18, the nucleic acid molecule comprising a sequence having at least 90% identity with the sequence shown in SEQ. ID. NO:4.

15 22. A composition for use in raising an immune response in an animal, the composition comprising a polypeptide as claimed in any one of claims 12 to 16 or a nucleic acid sequence as claimed in claim 17 and optionally a carrier and/or adjuvant.

20 23. A polypeptide, the polypeptide having an amino acid sequence as set out in SEQ. ID. NO:5, or a sequence having at least 60% identity thereto, or a functional fragment thereof.

25 24. A polypeptide as claimed in claim 23, the polypeptide having a sequence of at least 70% identity with the sequence shown in SEQ. ID. NO:5.

30 25. A polypeptide as claimed in claim 23, the polypeptide having a sequence of at least 80% identity with the sequence shown in SEQ. ID. NO:5.

26. A polypeptide as claimed in claim 23, the polypeptide having a sequence of at least 90% identity with the sequence shown in SEQ. ID. NO:5.

35 27. A polypeptide as claimed in any one of claims 23 to 26, the polypeptide having haemolysin activity.

28. A nucleic acid molecule, the nucleic acid molecule comprising a sequence encoding a polypeptide of any one of claims 23 to 27.

29. A nucleic acid molecule comprising a sequence as set out in SEQ. ID. NO:6 or a sequence having at least 60% identity thereto, or a sequence which hybridises thereto under stringent conditions.

5 30. A nucleic acid molecule as claimed in claim 29, the nucleic acid molecule comprising a sequence having at least 70 % identity with the sequence shown in SEQ. ID. NO:6.

10 31. A nucleic acid molecule as claimed in claim 29, the nucleic acid molecule comprising a sequence having at least 80 % identity with the sequence shown in SEQ. ID. NO:6.

15 32. A nucleic acid molecule as claimed in claim 29, the nucleic acid molecule comprising a sequence having at least 90 % identity with the sequence shown in SEQ. ID. NO:6.

20 33. A composition for use in raising an immune response in an animal, the composition comprising a polypeptide of any one of claims 23 to 27 or a nucleic acid sequence of claim 28 and optionally a carrier and/or adjuvant.

34. A composition for use in raising an immune response in an animal directed against *Moraxella*, the composition comprising at least one polypeptide selected from the group consisting of a polypeptide as claimed in any one of claims 1 to 5, a polypeptide as claimed in any one of claims 12 to 25 16, and a polypeptide as claimed in any one of claims 23 to 27, and optionally including an adjuvant or carrier.

30 35. A composition as claimed in claim 34, the composition comprising a polypeptide as claimed in any one of claims 23 to 27 and either one of, or preferably both of, a polypeptide as claimed in any one of claims 1 to 5 and a polypeptide as claimed in any one of claims 12 to 16.

36. A composition as claimed in claim 34 or claim 35 wherein the *Moraxella* is *M. bovis* or *M. catarrhalis*.

37. A composition as claimed in claim 34 or claim 35 wherein the *Moraxella* is *M. bovis*.

38. An antibody raised against a polypeptide selected from the group consisting of a polypeptide as claimed in any one of claims 1 to 5, a polypeptide as claimed in any one of claims 12 to 16, and a polypeptide as claimed in any one of claims 23 to 27.

